

REMARKS

Claims 1-12 are pending in the application. Claims 1-7, 11 and 12 are rejected. Claims 8-10 are objected to but would be allowable if placed in independent form.

Claim Rejections - 35 U.S.C. § 102

Claims 1-7, 11 and 12 are rejected under 35 U.S.C. § 102(b) as being anticipated by Henry (5,421,192). This rejection is traversed.

The Invention

As a preliminary matter, Applicant notes that the present invention concerns a liquefied refrigerant composition having five specific characteristics, as expressly set forth in the claims. The refrigerant composition comprises in combination (1) a liquefied non-CFC refrigerant (2) a UV fluorescent dye and (3) a solvent for predissolving the dye. As expressly recited in the claims, (4) the solvent is other than the refrigerant or a refrigeration system lubricant. Finally, (5) the refrigerant, dye and solvent comprise a uniformly homogenous composition in the liquid phase.

Applicant has amended claim 1 in order to specify the physical characteristics of the novel material, namely, "a liquefied refrigerant composition". Liquefaction of gases is a term well-understood in the art, and in the regard, Applicant encloses herewith a copy of page 5 to 6 from Chamber's Science and Technology Dictionary relating to "liquefaction of gases" and "liquefied petroleum gases". See also the enclosed copy of page 1024 from the Macquarie Dictionary, which equates "liquefied petroleum gas" (or LPG) with "bottled gas". Consistent with this focus on the refrigerant composition, Applicant also has amended the title to be "*Stable Compositions of Liquefied Refrigerant and UV Dye*"

Henry

The Examiner cites U.S. 5,421,192 (Henry) against claims 1 – 7, 11 and 12 of the present application. Henry relates to the effective leak detection of refrigerant from a hermetic circulatory refrigerant system by the addition of dyes to the circulatory refrigeration system. Henry does not add the dyes to the refrigerant composition for storage in liquefied form, for example, in a gas storage cylinder or container. Henry does not disclose or even consider the storage of a liquefied refrigerant composition comprising a combination of non-CFC refrigerant

and a UV fluorescent dye pre-dissolved in a solvent, wherein the refrigerant, dye and solvent comprise a uniformly homogenous composition in the liquid phase within the storage container or cylinder. Indeed, Henry's focus is on a composition in a hermetic circulatory refrigeration system, wherein, during operation thereof, the refrigerant evaporates and leaves the dye and solvent to mix with the lubricant oil of the refrigeration system, where they remain since the dye, its solvent and the lubricant will not be vaporized.

In the last sentence of item 2 of the Office Action, the Examiner states "The compositions are disclosed as circulating through the refrigeration system implying mutual solubility". In fact, this is not quite correct. The dye composition as outlined in Henry never mixes with the refrigerant. Instead, it mixes with incumbent system lubricant. It is not possible for the Henry composition to mix with the refrigerant and form a "uniformly homogenous mixture" because the refrigerant is constantly changing state from liquid to vapor as part of the refrigeration process.

The present invention provides a convenient and novel medium that is easily store and transported, and conveniently contains a refrigerant and dye, which can be readily used by motor mechanics, air-conditioning service personnel and the like. Because it is already mixed, the novel liquefied refrigerant composition can be used while avoiding problems of spillage, contamination, under-dosing or over-dosing, etc., as described in the first paragraph on page 3 of the PCT text. Clearly, Henry provides no disclosure of a composition with a long-term stable mixture of UV dye and liquefied refrigerant for storage and distribution.

Claims 1-7, 11 and 12 also are rejected under 35 U.S.C. § 102(b) as being anticipated by Parekh (4,758,366). This rejection also is traversed.

Again, Parekh does not teach a uniformly homogenous liquefied composition of refrigerant, dye and solvent in the liquid phase (i.e. within a pressurized storage cylinder). Similar to Henry, Parekh discloses that the dye composition solution, refrigeration oil and refrigerant are mixed separately (column 4, lines 56 – 66). However, there is no teaching of the dye, solvent and refrigerant comprising a uniformly homogenous composition in the liquid phase, as claimed in the present application. Moreover, there is no teaching about the storing of such liquefied compositions in a pressurized storage container.

As to the last sentence of item 3 of the Office Action, similar comments to those made above in respect of Henry are also applicable here, since the circulating refrigerant is constantly changing state from liquid to vapor as part of the refrigeration process. Parekh does not disclose a uniformly homogenous composition in the liquid phase.

Claim Rejections - 35 U.S.C. § 103

Claims 1-7, 11 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over either Parekh or Henry.

The Examiner appears to state that any possible differences that Applicants may argue would be obvious. In this regard, Applicant strongly submits that the homogenous liquefied refrigerant composition that is defined in the claims, is not obvious. Clearly, there is no teaching or suggestion that the claimed homogenous composition may be achieved, and to assert that such composition is obvious would improperly rely on hindsight based on the Applicant's own teachings.

Claims 1-7, 11 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 98/54150.

This reference concerns a leak detection composition comprising a dye used in a refrigerant lubricant, such as R-134a lubricants alone or in a mixture of two or more oils (pages 6-7). The reference further teaches adding the dye compound to a solvent, such as a high boiling point organic solvent, to avoid separation (page 8). The reference teaches that the lubricant composition may be combined with a refrigerant in a usual manner and used in a refrigeration system (page 9). The several examples, however, do not disclose the creation of a homogenous mixture that is stored in a cylinder under pressure.

The cited reference and the present invention are setting out to achieve two totally different ends. The cited reference relates to a specific naphthalimide derivative which is useful as a fluorescent leak detection dye in **lubricants**, a dye which "is compatible with a wide variety of lubricant compositions and oils and which will not crystallize or otherwise fall out of solution" (e.g. while circulating in the car air-conditioning system) "over a wide range of operating temperatures, duration and conditions".

This is a dye that is added to the refrigeration system **lubricant** without the need to first dissolve the dye into a carrier solvent (page 5, lines 10 – 12). There is no disclosure of a liquefied refrigerant composition (when stored in a pressurized gas storage cylinder) as claimed in the present application, whereby the refrigerant, dye and solvent comprise a uniformly homogenous composition in the liquid phase within the storage cylinder. The reference teaches that the lubricant composition may be combined with a refrigerant in the usual manner and used in a refrigeration system (page 9). The several examples, however, do not disclose the creation of a homogenous mixture that can be stored in a cylinder under pressure.

By contrast, the present invention concerns a refrigerant composition comprising in combination a liquid non-CFC refrigerant, a UV fluorescent dye and a solvent for predissolving the dye, where the solvent is other than the refrigerant or a refrigerant system lubricant, the cited reference discloses (at page 5, line 10) that the viscous nature of the product is such that pre-mixing with a solvent is not required before mixing this product with a system lubricant.

As to the obviousness rejection in general, the secondary factors recited in the *Graham v John Deere* case must be considered. The industry preference for mixing lubricants with UV dyes prior to sale is generated by the fact that most dyes at the time of manufacture are too strong in terms of concentration to be easily used by technicians without the risk of significant wastage or overdosing. Where the prior art teaches reduction of strength by dilution with a system lubricant, the dye's intended use is as an additive to be placed directly into a refrigeration system, with no prior mixture or contact with a refrigerant in, for example, a cylinder or other storage vessel. The exact opposite is true for a dye and refrigerant mixture, as it is desirable to keep the level of foreign material in the refrigerant to a minimum. This is why the present inventor teaches the use of a solvent other than a system lubricant, so as to achieve the highest possible concentrate strength. It is to be noted that in the four year period since its commercial release, the applicants have seen the product, the subject of the present application, replace more than 60% of their previous market for gas sold without UV dye. Products such as those disclosed in the prior art have lost market support, which has been transferred to the pre-mixed product the subject of the present application. The ability of the product of the present invention to reduce mess and wastage, as compared to dyes injected separately into a refrigeration system, has resulted in the product of the present invention becoming almost an industry standard in

automotive air-conditioning circles. The fact that the dye is no longer separately sold to technicians in small bottles of concentrate has resulted in reduction of wastage and even a reduction in theft of the dye. In one case, a competitor losing market share to the product of the present invention began to freely give away expensive dye injectors, in an attempt to stem the flow of his gas clients to the applicant's new gas and dye product. It was ultimately unsuccessful, and costly for this competitor. The market could easily see advantages in the applicant's product concept.

In terms of efficiency, Applicant's customers who use this product have been very pleased with the way it has eliminated the need to separately inject UV dye by having the dye charge take place at the time of refrigerant charge. There have been attempts on the part of some of Applicant's competitors to imitate the product by using dyes dissolved only in system lubricants. However, such a mixture is not suitable and results in a sub-standard product, which the market quickly identified as such and rejected. The Applicant has taken this as further evidence of the merit of a stronger and more complex solvent system in this product, and its effectiveness as compared to the conventional industry practice of mixing dyes with system lubricants.

Those who use this product have shown a strong disinterest in purchasing gas from competing suppliers that do not include dye with their refrigerant. This loyalty has been very valuable in a market where price is the over-riding consideration for customers, and where discounting is commonplace. Such is the nature of its appeal, the price has remained constant in a market where refrigerant prices have been continually falling.

New and Amended Claims

Claim 1 has been amended in order to focus the invention on the composition. Claim 8 now depends from claim 2. As explained in the specification at page 9, the solvent may comprise a mixture of fatty acid ethoxylate and alcohol ethoxylate. This combination prevents the dye from being released from the solvent when it is combined with the liquid refrigerant, as explained at page 11.

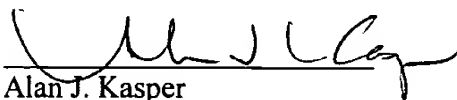
New claims 13-15 have been added and are directed to the combination of a liquefied refrigerant composition and a pressurized container. These, additional claims would be patentable because of a combination of such mixture within a cylinder.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

Please delete the current Title and substitute therefor the following:

STABLE COMPOSITIONS OF LIQUEFIED REFRIGERANT AND UV DYE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A liquefied refrigerant composition ~~when stored in a pressurised gas storage cylinder, said composition comprising~~ in combination a liquid-non-CFC refrigerant and a UV fluorescent dye pre-dissolved in a solvent for said dye, wherein said solvent is other than the refrigerant or a refrigeration system lubricant, whereby said refrigerant, dye and solvent comprise a uniformly homogenous composition in the liquid phase ~~within said storage cylinder.~~

8. (Amended) A refrigerant composition as claimed in claim 1-2, wherein the solvent comprises a mixture of fatty acid ethoxylate and alcohol ethoxylate.

New claims 13-15 are added